ISSN: 2320-5407

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: **IJAR-53345** Date: 16-08-2025

Title: Design and Development of an IoT-Enabled Smart Air-Purifying and Monitoring Mask for Hazardous Industrial Environments

Recommendation:
Accept as it is .....YES.....
Accept after minor revision.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality			✓	
Techn. Quality			✓	
Clarity		✓		
Significance			✓	

Reviewer Name: Mir Bilal

Reviewer's Comment for Publication.

Content Review:

The manuscript addresses an important and timely issue of occupational health risks in hazardous industrial environments, with a particular focus on air pollution exposure faced by workers in developing countries. The abstract provides a concise overview of the system's design, components, and practical applications, establishing the significance of the research within the broader context of environmental health and industrial safety.

The abstract is comprehensive, clearly outlining the technical framework of the proposed smart mask. It integrates sensor technology, air purification, IoT-based data transmission, and user feedback mechanisms into a single, wearable system. Specific details, such as the use of MQ135 and MQ9 gas sensors, DHT11 environmental sensor, HEPA and activated carbon filtration, CPU fan control, NeoPixel LED indicators, and wireless connectivity via ESP8266 and Blynk platform, demonstrate the technical depth of the design. Furthermore, the abstract highlights key practical considerations such as ergonomics, cost-efficiency, and suitability for large-scale adoption in resource-constrained regions.

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The introduction contextualizes the study by emphasizing the global and regional burden of air pollution, citing statistics from the Global Burden of Disease study and occupational risk reports. It draws attention to the inadequacy of conventional masks in industrial settings and outlines the necessity of developing a more advanced, adaptive solution. The narrative builds a strong case for the research by linking environmental exposure, health consequences, and gaps in existing technology. The integration of occupational safety challenges faced by vulnerable worker groups, such as rag pickers and miners, underscores the socio-economic importance of the research.

The system description combines both hardware and software dimensions of the prototype. The adoption of IoT-based real-time monitoring and mobile connectivity offers not only immediate feedback but also historical data tracking, which is valuable for long-term occupational health monitoring. The inclusion of a buzzer for hazard alerts, battery-powered portability, and ergonomic design considerations further reflects a holistic approach to addressing worker safety.

The experimental validation under simulated industrial conditions demonstrates the prototype's functional reliability in terms of sensor accuracy, adaptive filtration response, and robust data communication. This establishes the feasibility of the design for real-world deployment. The discussion of potential future developments, such as AI-based predictive analytics and cloud-based monitoring, indicates scope for scalability and integration into broader occupational health management systems.

Overall Assessment:

The manuscript makes a significant contribution to occupational safety, wearable health devices, and environmental sensing research. It successfully combines air purification technology with IoT-enabled monitoring to create a practical and cost-effective solution tailored for industrial environments. The work demonstrates a strong balance between technical innovation, practical usability, and social relevance, positioning it as a valuable study for both engineering and public health domains.
